

This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

1.     *(Currently amended)* A vortex reactor, comprising:
  - a substantially frustum-shaped portion forming a reaction chamber therein, said frustum-shaped portion having a narrower part that is downwardly oriented;
  - an axial flow apparatus fluidly connected to the reaction chamber for creating an axial gas flow in said reaction chamber, whereby the axial flow apparatus comprises a flow restrictor optionally comprising a vertical rod attached thereto and is configured so as to provide an axial gas flow into the bottom of the reaction chamber, directed upward;
  - a circumferential flow apparatus fluidly connected to the reaction chamber for creating a circumferential gas flow in said reaction chamber;
  - a plasma generating device, configured so that the flow restrictor and/or the vertical rod optionally attached thereto can act as a first electrode and a wall of the frustum-shaped reaction chamber can act as a second electrode of the plasma generating device;
  - an apparatus for applying a voltage difference between said first electrode and said second electrode;
  - a solid particulate inlet connected to said reaction chamber.
2.     *(Currently amended)* The vortex reactor of claim 1, wherein said axial flow apparatus comprises a gas supply inlet ~~and an apparatus selected from the group consisting of a porous bed and a flow restrictor.~~
3.     *(Currently amended)* The vortex reactor of claim [[2]] 1, wherein said flow restrictor further comprises at least one channel therein which provides a fluid connection between said gas supply and said reaction chamber.
4.     (Original) The vortex reactor of claim 3, wherein said circumferential flow apparatus is located below said flow restrictor.

5. (Original) The vortex reactor of claim 4, wherein a cross-sectional area of said at least one channel tapers from a first, cross-sectional area at an end of the channel that is fluidly connected to said gas supply, to a smaller, second, cross-sectional area at an end of the channel that is fluidly connected to the reaction chamber.
6. (Original) The vortex reactor of claim 1, wherein said apparatus for creating circumferential gas flow comprises a gas supply and one or more gas inlet nozzles oriented tangentially relative to a sidewall of the narrower part of said frustum-shaped portion.
7. (Original) The vortex reactor of claim 1, wherein said reactor further comprises a bottom entry tube fluidly connected to said reaction chamber at the narrower part of said frustum-shaped portion, and said apparatus for creating circumferential gas flow comprises a gas supply and one or more gas inlet nozzles oriented tangentially relative to a sidewall of the bottom entry tube.
- 8-9. *(Canceled)*
10. *(Currently amended)* The vortex reactor of claim 1 [[9]], wherein said flow restrictor is positioned to provide a small gap between said first and second electrodes for initiation of a plasma generating electrical arc at said small gap, and said flow restrictor is shaped to provide a gradual increase in the size of said gap between said first and second electrodes in an upward direction to provide a geometry for producing a gliding arc in said reaction chamber.
11. *(Canceled)*
- 12-36. *(Canceled)*